28. (Amended) A method of radio frequency communication, the method comprising:

receiving a radio frequency interrogation signal from an interrogator;

phase modulating the interrogation signal according to an information code to produce a response signal containing a plurality of phases that are each different than a phase of the interrogation signal; and transmitting the response signal.

REMARKS

Claims 1-28 are presented for further examination. Claims 1-4, 6-8, 10-15, 17-20, 22-23, and 25-28 have been amended.

The Examiner has rejected claims 1-7, 10-13, 16-22 and 25-28 as anticipated by United States Patent Number 5,247,305 issued to Hirata, et al. Applicants respectfully traverse the Examiner's contention that Hirata is an anticipating reference and request further examination of the claims.

Claim 1 as amended recites "a switch having a control terminal and first and second conduction terminals, the first conduction terminal being coupled to the antenna; a stub having a length other than a wavelength of the interrogation signal and being coupled to the second conduction terminal of the switch; and a driver coupled between the memory and the control terminal of the switch."

In Hirata, the Examiner points to switch 61 of Figure 5 and argues the first conduction terminal is P1 and the second conduction terminal is P2. The Examiner then argues that micro-strip line 184 of Figure 15 is the claimed stub. The Examiner does not identify what portions of Figure 15 correspond to the claimed switch and its control and first and second conduction terminals. The only thing shown in Figure 15 that has a first terminal coupled to the antenna B1 and a second terminal coupled to the micro-strip line 184 is a diode 190. There is no indication in the description of Figure 15 that the diode 15 functions as a switch that has a control terminal coupled to a driver. To the extent the modulator E of Figure 15 is viewed as the claimed switch, the micro-strip line 184 would be coupled to the same conduction terminal as the antenna B1.

Thus, Hirata does not disclose a switch having a control terminal and first and second conduction terminals, the first conduction terminal being coupled to the antenna and a stub being coupled to the second conduction terminal, as recited by independent claim 1. Applicants respectfully submit that independent claim 1 and the claims which depend therefrom are not anticipated by Hirata.

Similarly, independent claim 10 as amended recites "a switch coupled between the stub and the antenna and having a control terminal; a driver coupled between the memory and the control terminal of the switch, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal alternately opening and closing the switch." Independent claim 17 as amended recites: "switching means coupled to the stub means and responsive to the modulating signal." Independent claim 25 as amended recites "alternately opening and closing a switch according to a modulating signal corresponding to the information code, the switch being coupled between an antenna that transmits the response signal and a stub that has a length other than a wavelength of the interrogation signal." While the language and scope of independent claims 10, 17 and 25 are not identical to those of claim 1, Hirata is not an anticipating reference to those claims and the claims that depend therefrom for reasons similar to those set forth above with regard to claim 1. Thus, Hirata is not an anticipating reference to claims 1-3, 10-11, 17-19, and 25-26.

Claim 4, which has been amended and restated in independent form, recites: "a phase modulator having a diode, a first terminal of the diode coupled to the antenna and a driver coupled between the memory and a second terminal of the diode, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal being a variable voltage that modulates a capacitance of the diode to phase modulate the interrogation signal and thereby produce the response signal." The Examiner points to diode 53 and diode 63 (of Figures 4 and 5) as the claimed diode and to ROM 36 in Figure 2 and RAM 1140 in Figure 17 as the claimed memory. The Examiner points to identification code generator D as the claimed driver. However, diode 53 is coupled directly to the memory 36 (see column 5, lines 13 to 15 and Figures 1 and 2), thus there is no driver coupled between the memory 36 and the diode 53, as recited in claim 4. With regard to Figure 17, the same terminal of the diode that is coupled

to the antenna is coupled to the identification code generator D. Accordingly, Hirata is not an anticipating reference for independent claim 4 and claim 5, which depends from claim 4.

While the language and scope of claims 12, 20, and 27, as amended and as restated in independent form, are not identical to those of claim 4, independent claims 12, 20 and 27 are not anticipated by Hirata for reasons similar to those set forth above with respect to claim 4. Accordingly, applicants respectfully submit that claims 4, 5, 12, 20, 21, 22 and 27 are in allowable form.

Claim 6, which has been amended and restated in independent form, recites "a first diode having first and second ends, the second end being coupled to the antenna; a second diode having first and second ends, the first end being coupled to the antenna and the second end of the first diode; a stub being coupled to the second end of the second diode; a parallel RC circuit coupled between the stub and a reference voltage; and a driver coupled between the memory and the first end of the first diode." The Examiner points to diode 71 in Hirata as the first diode and diode 73 as the second diode in reference to Figure 6. Figure 6 does not illustrate a micro-strip line. The Examiner points to the line 184 in Figure 15 as the stub. The only two diodes shown in Figure 15 are diodes 188 and 190. Diode 190 is the only diode shown coupled to the micro-strip line 184. Thus, diode 188 must be the first diode. The second end of diode 188 is connected to the antenna; however, the first end of diode 188 is connected to a reference voltage (ground) and not to a driver. Accordingly, claim 6 is not anticipated by Hirata.

Claim 13 has been amended and restated in independent form. While the language and scope of independent claim 13 are not identical to those of claim 6, claim 13 is not anticipated by Hirata for reasons similar to those set forth above with regard to claim 6. In addition, claim 13 recites "a second diode having an anode and a cathode, the anode of the second diode being coupled to the antenna and to the cathode of the of the first diode." The diodes shown in Figure 6 and Figure 15 have their anodes coupled together. Thus, Hirata does not disclose the anode of the second diode being coupled to the cathode of the first diode. Accordingly, claim 13 is not anticipated by Hirata.

Claim 7, which has been amended and restated in independent form, recites "a phase modulator structured to produce a response signal according to the information code, the response signal containing a plurality of phases in addition to a phase that is substantially

identical to a phase of the interrogation signal." The Examiner points to column 5, lines 46-66, in Hirata which discusses the reflection coefficient of the circuit of Hirata. It does not teach or suggest a response signal containing a plurality of phases in addition to a phase that is substantially identical to a phase of the interrogation signal, as recited in claim 7. Thus, claim 7 is not anticipated by Hirata. While not identical to claim 7 in language or scope, claims 14 and 28, as amended, are not anticipated by Hirata for similar reasons. Accordingly, Applicants submit that claims 7-9, 14-16, and 28 are in allowable form.

The Examiner also rejected claims 8-9, 15-16, and 23-24 as obvious over Hirata in view of United States Patent No. 3,656,069 issued to Beccone, et al. As noted above, Hirata does not disclose a response signal containing a plurality of phases in addition to a phase that is substantially identical to a phase of the interrogation signal. Thus, it would not have been obvious to combine the multiphase digital modulator of Beccone with Hirata to achieve the invention set forth in claims 8-9, 15-16 and 23-24. In addition, the substantial gap in time between Beccone and Hirata, and between Hirata and the filing date of the present application, supports Applicants' position that it would not have been obvious to combine the two references. Applicants note that claim 23 has been restated in independent form.

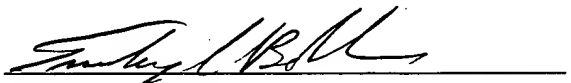
Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version With Markings to Show Changes Made.**"

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

Curtis Lee Carrender et al.

SEED Intellectual Property Law Group PLLC



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 1-4, 6-8, 10-15, 17-20, 22-23, and 25-28 have been amended to read as follows:

In the Claims:

1. (Amended) A radio frequency transponder, comprising:

an antenna for receiving an interrogation signal;

a memory that stores an information code; and

a phase modulator ~~coupled to the antenna and memory,~~ comprising:

a switch having a control terminal and first and second conduction terminals, the first conduction terminal being coupled to the antenna;

a stub having a length other than a wavelength of the interrogation signal and being coupled to the second conduction terminal of the switch; and

a driver coupled between the memory and the control terminal of the switch~~coupled to the antenna and memory, the phase modulator being structured to produce a backscatter response signal by phase modulating the interrogation signal according to the information code~~.

2. (Amended) The transponder of claim 1 wherein the ~~phase modulator includes:~~

~~a switch having a control terminal and first and second conduction terminals, the first conduction terminal being coupled to the antenna;~~

~~a quarter-wavelength~~ stub ~~coupled to the second conduction terminal of the switch; and~~

~~a driver coupled between the memory and the control terminal of the switch, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal alternately opening and closing the switch~~is a quarter-wavelength stub.

3. (Amended) The transponder of claim ~~2~~1 wherein the driver includes a microprocessor.

4. (Amended) A radio frequency ~~The~~ transponder, ~~of claim 1~~comprising:

an antenna for receiving an interrogation signal;

a memory that stores an information code; and

a phase modulator having ~~wherein the phase modulator includes~~ a diode, a first terminal of the diode coupled to the antenna and a driver coupled between the memory and a second terminal of the diode, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal being a variable voltage that modulates a capacitance of the diode to phase modulate the interrogation signal and thereby produce the response signal.

6. (Amended) A radio frequency transponder, comprising:

an antenna to receive an interrogation signal;

a memory to store an information code; and

a phase modulator having:~~The transponder of claim 1 wherein the phase modulator includes~~:

a first diode having first and second ends, the second end being coupled to the antenna;

a second diode having first and second ends, the first end being coupled to the antenna and the second end of the first diode; ~~;~~

~~a quarter-wavelength~~ a stub being coupled to the second end of the second diode;

a parallel RC circuit coupled between the stub and a reference voltage; and

a driver coupled between the memory and the first end of the first diode, the driver being structured to produce a modulating signal corresponding to the information code.

7. (Amended) A radio frequency transponder, comprising:

an antenna to receive an interrogation signal;

a memory that stores an information code; and

a phase modulator ~~The transponder of claim 1 wherein the phase modulator is~~ structured to produce a ~~include in the~~ response signal according to the information code, the response signal containing a plurality of phases in addition to a phase that is substantially identical to a phase of the interrogation signal.

8. (Amended) The transponder of claim ~~1~~7 wherein the phase modulator includes first and second phase changers that produce in the response signal respective first and second phases that are each different than a phase of the interrogation signal.

10. (Amended) A radio frequency communication system, comprising:

an interrogator that transmits a radio frequency interrogation signal and receives a backscatter response signal; and

a transponder that receives the interrogation signal and transmits the response signal to the interrogator, the transponder ~~including~~ comprising:

an antenna;

a memory that stores an information code; and

a phase modulator coupled to the memory ~~and structured to produce the response signal by phase modulating the interrogation signal according to the information code~~, the phase modulator comprising:

a stub having a length other than a wavelength of the interrogation signal;

a switch coupled between the stub and the antenna and having a control terminal;

a driver coupled between the memory and the control terminal of the switch, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal alternately opening and closing the switch.

11. (Amended) The communication system of claim 10 wherein the stub comprises ~~transponder includes an antenna that receives the interrogation signal and transmits the response signal and the phase modulator includes:~~

a quarter-wavelength stub~~;~~

~~a switch coupled between the stub and the antenna and having a control terminal;~~ ~~and~~

~~a driver coupled between the memory and the control terminal of the switch, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal alternately opening and closing the switch~~.

12. (Amended) A radio frequency communication system, comprising: ~~The communication system of claim 10~~

an interrogator to transmit a radio frequency interrogation signal and to receive a backscatter response signal; a transponder, ~~wherein~~ the transponder includes~~ing~~:

a memory that stores an information code;

an antenna to receive the interrogation signal and to transmit the response signal; and

a phase modulator coupled to the memory and structured to produce the response signal by phase modulating the interrogation signal according to the information code, ~~an antenna that receives the interrogation signal and transmits the response signal and~~ the phase modulator ~~includes~~ including a diode coupled at a first end to the antenna and a driver coupled between the memory and a second end of the diode, the driver being structured to produce a modulating signal corresponding to the information code, the modulating signal being a variable voltage that modulates an impedance of the diode to phase modulate the interrogation signal and thereby produce the response signal.

13. (Amended) A radio frequency communications system, comprising:

an interrogator to transmit a radio frequency interrogation signal and to receive a backscatter response signal; and

a transponder comprising ~~The communication system of claim 10 wherein the transponder includes:~~

-an antenna ~~that~~o receives the interrogation signal and to transmits the response signal;

~~-and the~~a ~~phase modulator includes:~~

a first diode having ~~first and second ends~~an anode and a cathode, the ~~second end~~cathode of the first diode being coupled to the antenna;

a second diode having ~~first and second ends~~an anode and a cathode, the ~~first end~~anode of the second diode being coupled to the antenna and to the ~~second end~~cathode of the of the first diode;

a quarter-wavelength stub coupled to the ~~second end~~cathode of the second diode;

a parallel RC circuit coupled between the stub and a reference voltage; and

a driver coupled between the memory and the ~~first end~~anode of the first diode, the driver being structured to produce a modulating signal corresponding to the information code.

14. (Amended) A radio frequency communication system, comprising:

an interrogator to transmit a radio frequency interrogation signal; and

a transponder to receive the interrogation signal and to transmit a response signal, the transponder including:

a memory that stores an information code; and

~~The communication system of claim 10 wherein the~~a phase modulator ~~is~~ structured to include in the response signal a plurality of phases in addition to a phase that is substantially identical to a phase of the interrogation signal.

15. (Amended) The communication system of claim 1~~0~~4 wherein the phase modulator includes first and second phase changers that produce in the response signal respective first and second phases that are each different than a phase of the interrogation signal.

17. (Amended) A radio frequency transponder, comprising:

means for receiving a radio frequency interrogation signal from an interrogator;

means for phase modulating the interrogation signal according to an information code to produce a response signal; and

means for transmitting the response signal, wherein the phase modulating means includes:

stub means having a length other than a wavelength of the interrogation signal;

signal producing means for producing a modulating signal corresponding to the information code; and

switching means coupled to the stub means and responsive to the modulating signal.

18. (Amended) The transponder of claim 17 wherein the ~~phase modulating means include:~~

stub means having a length other than a wavelength of the interrogation signal is a quarter-wavelength stub~~;~~

~~a switch coupled to the stub means and having a control terminal; and~~

~~signal producing means for producing a modulating signal corresponding to the information code, the modulating signal being applied to the control terminal of the switch to alternately open and close the switch~~.

19. (Amended) The transponder of claim 187 wherein the signal producing means include a memory that stores the information code and processing means coupled to the memory, the processing means being for producing the modulating signal as a function of the information code.

20. (Amended) A radio frequency transponder, comprising:

means for receiving a radio frequency interrogation signal from an interrogator;

means for phase modulating the interrogation signal according to an information code to produce a response signal; and

means for transmitting the response signal, ~~The transponder of claim 17~~ wherein the phase modulating means include ~~diode means and~~ driver means for producing and applying to ~~the~~ a diode means a modulating signal corresponding to the information code, the modulating signal being a variable voltage that modulates an impedance of the diode means to phase modulate the interrogation signal and thereby produce the response signal, the diode means being coupled between the driver means and the means for transmitting the response signal.

22. (Amended) The transponder of claim 20 wherein the ~~phase modulating~~diode means include:

a first diode coupled to the transmitting means;

a second diode coupled to the ~~antenna~~transmitting means and the first diode;

a quarter-wavelength stub coupled to the second diode;

a parallel RC circuit coupled between the stub and a reference voltage; and

a driver means coupled to the first diode, the driver means being for producing and applying to the first diode a modulating signal corresponding to the information code.

23. (Amended) A radio frequency transponder, comprising:

means for receiving a radio frequency interrogation signal from an interrogator;

means for phase modulating the interrogation signal according to an information code to produce a response signal; and means for transmitting the response signal~~The transponder of claim 17~~, wherein the phase modulating means include first and second phase changers that produce in the response signal respective first and second phases that are each different than a phase of the interrogation signal.

25. (Amended) A method of radio frequency communication, the method comprising:

receiving a radio frequency interrogation signal from an interrogator;

phase modulating the interrogation signal according to an information code to produce a response signal by alternately opening and closing a switch according to a modulating signal corresponding to the information code, the switch being coupled between an antenna that

transmits the response signal and a stub that has a length other than a wavelength of the interrogation signal; and

transmitting the response signal.

26. (Amended) The method of claim 25 wherein the ~~phase modulating step includes:~~

~~alternately opening and closing a switch according to a modulating signal corresponding to the information code, the switch being coupled between an antenna that transmits the response signal and a~~ stub that has a length other than a wavelength of the interrogation signal is a quarter-wavelength stub.

27. (Amended) A method of radio frequency communication, the method comprising:

receiving a radio frequency interrogation signal from an interrogator;

phase modulating the interrogation signal according to an information code to produce a response signal~~The method of claim 25 wherein the phase modulating step includes~~ by producing a modulating signal corresponding to the information code, the modulating signal being a variable voltage ~~that modulates a capacitance of~~applied to a first terminal of a diode to phase modulate the interrogation signal and thereby produce the response signal; and

transmitting the response signal from an antenna coupled to a second terminal of the diode.

28. (Amended) A method of radio frequency communication, ~~T~~the method comprising:~~of claim 25~~

~~-~~receiving a radio frequency interrogation signal from an interrogator;

phase modulating the interrogation signal according to an information code to produce a response signal containing~~wherein the phase modulating step includes producing in the response signal~~ a plurality of phases that are each different than a phase of the interrogation signal; and

transmitting the response signal.